

Engineering Heritage Australia

Newsletter of the National Committee on Engineering Heritage

The Institution of Engineers, Australia

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No. 4

May 1995

Old Ways in a New Land

First Australasian Conference on Engineering Heritage, Christchurch NZ, 28 - 30 November 1994

As John Pollard, Chairman of IPENZ Heritage Committee and Conference Organiser kept repeating, "never in our wildest dreams..." did the organising committee expect such an outstanding and well attended conference. Seventy three delegates were present (39 from Australia) and 45, including partners, participated in the pre-conference train and coach tour of heritage sites on the west coast.

The tour was both fascinating and socially excellent. Biddy Pollard acted as marshal and her botanical knowledge was ably complemented by the archaeological, architectural and geological expertise of

other guides. In brief, the tour included visits to the listed concrete water tower at Addington; the Grey gold dredge; gold town relics at Kumara; coke oven complex and suspension bridge at Brunner; the Denniston Incline and ghost town; the 'swing bridge' at Nelson Creek; C Y O'Connor bridge columns for the Tiapo Bridge; remnants of Reefton hydro plant (first public electricity supply in the Southern Hemisphere); the Boving's Turbine No. 1 at Maruia Springs; and museums at Coaltown and Reefton.

The Keynote Address for the Conference was given by Professor Jack Cowan, the IE Aust Eminent Speaker for 1994. Twenty seven papers followed (by archaeologists, scientists, heritage consultants, architects and engineers) and covered a wide field, as can be seen from the accompanying list. (See page insert)

Other conference tours were to Lyttleton to inspect: Moorehouse railway tunnel portal, the Port Company's Dry Dock and the coastal defences from the Victorian era, at Fort Jervois on Ripapa Island; to Ferrymead to see restoration work on the original Christchurch tram fleet; and to McLean's Island to see restored steam equipment, including some timber haulage locomotives.

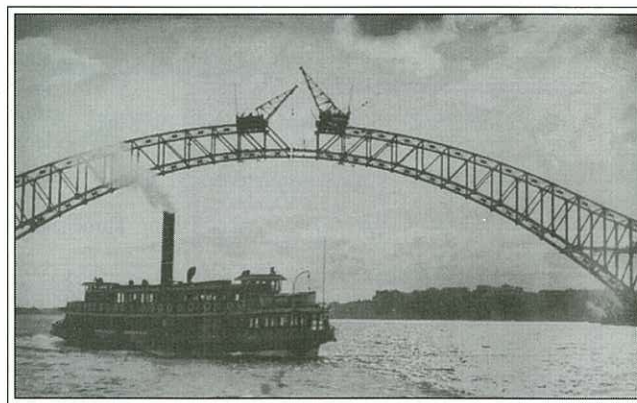
The highlight of the superb social program was the Conference Dinner at the Gondola Restaurant on Mt Cavendish, overlooking Lyttleton Harbour and the Canterbury Plains.

"Never in our wildest dreams..." did we expect such a marvellous conference and such warm hospitality. Congratulations and thanks, IPENZ!

Sydney Harbour Bridge Video

For many years Sydney Division held two large reels of 16mm movie films of the construction of Sydney Harbour Bridge shot during 1930-32 by freelance photographer Henri Mallard when he received permission from Lawrence Ennis, Dorman Long's Director of Construction. The Division also had a reel to reel tape recording of a description of the film by 80 year old Bill Litchfield who was one of J J C Bradfield's supervising engineers. From time to time special evening showings were organised but, although popular, they were not always technically successful. Arthur Boyd and George Fox envisaged the time when a compact version would be made for greater distribution. The opportunity came when the 75th Anniversary Committee sought projects and events for the celebrations programme.

By this time the technology of the compact audio-visual video cassette was available so the Committee endorsed the project with some financial assistance from 75th Anniversary sponsors. The audio-visual expertise of Owen Munn of the AV Unit of the University of NSW and Don Fraser's knowledge of the history and engineering details of the famous bridge were combined to edit the original material, add some graphics, some music and some new dialogue to complement Litchfield's commentary, and finally produce two videos of 25 and 50 minute duration. The launch took place during Professional Engineers' Week at the Powerhouse



Museum on 7 September 1994. Copies have been on sale since Christmas and the initial response saw 200 sold. The contact at Sydney Division office is Carole Farr on (02) 929 8544. The programmes are wonderful pieces of visual engineering heritage with the shorter version ideal for schools.

Prices:	25 min	50 min
IE Aust member	\$12.50	\$20.00
Non member	\$15.00	\$25.00
Postage	\$5.00	

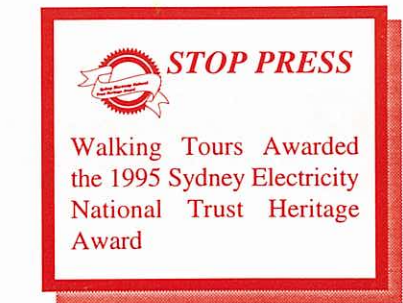
Walking Tours of Sydney's Engineering Heritage

The walking guide *Sydney's Engineering Heritage - Walks in the City* is proving popular with those interested in exploring the city's evolution since the beginning of the Colony. It was produced by Sydney Division's Engineering Heritage Committee and was launched on 18 October last year, by Hon Robert Webster, Minister for Planning.

To further its purpose of promoting heritage conservation, and creating awareness of engineering heritage and of the role of engineers in the building of Sydney, the Committee is conducting

walks based on the booklet. The first of these were during Seniors Week in March, when 47 people participated in three walks, each lasting two hours. They covered the area from Argyle Street in The Rocks, to the Opera House and up town to the General Post Office.

A similar walk will be conducted in conjunction with the Royal Australian Historical Society on 8 April during Heritage Week and will include a visit to History House. Another walk is planned for 9 September during National Engineering Week.



The booklet is priced at \$4.95 and can be purchased through Sydney Division office, retailers of heritage and tourist literature and of maps, or by mail order from PO Box 694, Marsfield NSW 2122 at \$6, including postage.

NSW Railway Heritage Committee

In June 1994 a new Railway Heritage Committee was established by the State Rail Executive Board with the primary function of advising State Rail on management of railway heritage issues. The new body has been given executive powers to direct State Rail business groups, CityRail, Freight Rail and Country Link, to implement the corporate policy on heritage. The committee, under the chairmanship of ChiExecutive John Brew, consists of representatives from the Heritage Council of NSW, the National Trust, the Royal Australian Institute of Architects, preservation groups and the Institution of Engineers, Australia. Don Fraser from the Association of Railway Engineering Heritage Committee of

Sydney Division was nominated by the Division to represent the Institution. The Committee has met monthly since July 5.

Its objectives include:

- ensuring that management of railway heritage is integrated into the mainstream of State Rail
- to establish and maintain a register of railway heritage assets, currently estimated to be over 2,500 at 400 locations
- adjudicate on disputes involving conservation, alterations, even demolition, of heritage items
- approve the sale, transfer or loan of assets with high heritage significance
- prepare a strategic plan to implement corporate policy
- to generate staff awareness programmes.

established to advise on buildings, structures and landscaping; on rolling stock; and on plant, equipment and other relics. With the settling-in period virtually at an end, the committee will begin the more pro-active phase of its brief.

By personally taking on Chairmanship of the Committee, John Brew has sent a clear message to everyone in State Rail, and to the community at large, about the importance he attaches to heritage matters. Further, through the composition of the Committee and by giving it executive powers, State Rail has acknowledged its stewardship responsibility to manage its assets and conserve its heritage, on behalf of the people of New South Wales.

John Brew's enlightening leadership in relation to heritage, is an outstanding example to other Government authorities and indeed, to industry.

Three sub-committees have been

BEWARE! The Brisbane City Council has recently opened its own archive and is charging the public a registration fee of \$25 (\$100 for corporate bodies or researches seeking information for business or income-producing reasons) on the occasion of the first visit and the fee will apply for only one year and be confined to a single subject. This is the first attempt in Queensland by a public archive to charge for all its services and it is being bitterly resisted by individuals and historical societies.



Plaquing Proceedings

Two Plaquing Booklets Launched

During the Engineering Heritage Conference in Christchurch, New Zealand, two important publications concerning the Institution's plaquing programme were launched. One was the new version of the *Guide to the Australian Historic Engineering Plaquing Programme*, which had been under review by Sub-committee convenor, Don Fraser, throughout 1994. The main improvements have been to (a) better define the objectives of the programme, (b) add a list of criteria, (c) clarify the contents and presentation of the documentation supporting a nomination and (d) call for nominees to prepare a statement of significance. Also, based on the experiences with plaquing ceremonies in recent times, that part of the *Guide*

dealing with plaquing ceremonies has been reworked and new information included. The booklet has now been published in the more compact B5 format and copies are available, free, from Division offices or from Rob Breen at National Headquarters.

At the back of the *Guide* is a list of the 38 plaqued works, 10 NELs and 28 HEMs, from August 1994.

As part of the Institution's 75th Anniversary celebrations the National Committee on Engineering Heritage commissioned the Sydney Engineering Heritage Committee to produce a booklet suitable for sale throughout Australia. The

booklet devotes a B5 page to each of the plaqued works. There is a brief history of the work, its location, the plaque wording and, where possible, a bio-sketch of the principal engineer associated with the work. Paul Hagenbach, Mike Clarke and Don Cottee gathered the material and worked with graphic designers Montague Design Pty Ltd to produce this interesting reference booklet. It has to be sold to recoup costs and currently may be purchased for \$6 plus postage from Sydney Division Office.

Both booklets were formally launched at the Conference Dinner on behalf of the Institution by Don Fraser.

Record Number of Plaquing Ceremonies

The 75th Anniversary of the Institution, 21-22 October 1995, provided the stimulus for a dramatic increase in the number of successful nominations of engineering works for heritage awards under the Australian Historic Engineering Plaquing Programme. Starting in April 1994 and through to February 1995 a total of twelve plaques were attached to significant engineering objects. Nine of the plaques were awarded under the National Programme and three were special awards by Sydney Division as part of their anniversary celebrations.

Interested in Engineering Heritage?

Why not subscribe to the Multi Disciplinary Transactions of the Institution.

These Transactions regularly contain interesting papers on Engineering Heritage. In fact the next issue will be a special Engineering Heritage Issue and will include many of the papers given at the recent Christchurch Conference.

Contact the Institution in Canberra if you are interested.

National Engineering Landmarks

Waddamana "a" Power Station	Waddamana, Tasmania	February 1995
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Historic Engineering Markers

Sewage Pumping Station	Spotswood, Melbourne	April 1994
Prospect Reservoir	Prospect, Sydney	April 1994
Medlow Bath Dam	Medlow Bath, NSW	July 1994
Whipple Railway Trusses	Lewisham, Sydney	October 1994
Remnant of Jervois Bridge	Port Adelaide, SA	October 1994
Perth Wireless Station	Adross, Perth	October 1994
Locomotive 3801	Robertson, NSW	November 1994
Ultimo Power Station	Powerhouse Museum, Sydney	November 1994

Sydney Division Plaques

Harricks Auditorium	Milsons Point, Sydney	September 1994
Sydney Tower	Centre Point, Sydney	September 1994
Eastern Suburbs Railway	Martin Place, Sydney	October 1994.

Professor Emeritus Ray Whitmore has almost completed a detailed study of the beginnings of reticulated water supplies in Queensland. In the 20 years after separation from NSW in 1859, Brisbane and five other towns received piped water. However, only Brisbane was able to adopt a gravity system, the others relying on pumping water from wells, swamps or rivers. Because of grave shortages both in expertise and money most of the schemes proved unsatisfactory and the design of most of them, William Highfield, finished up in jail for embezzling the Government funds provided for building them!

Tasmania's First National Engineering Landmark

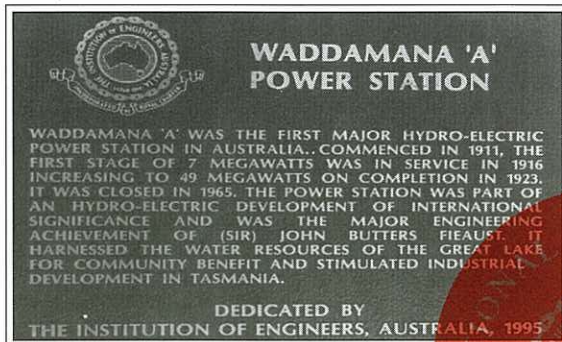
On February 18th 1995 a National Engineering Landmark Plaque was unveiled on the Waddamana "A" Power Station in Tasmania's Central Highlands.

The Power station is quite remote being in about the geographic centre of Tasmania and 50km from the nearest town. However on a perfect summer day almost 100

people attended for the ceremony which had its last minute difficulties. First the Minister for Energy who was to unveil the plaque had to attend urgent business on the mainland, so a substitute was found in the Minister for Transport and Works, Mr Ian Braid. Then Professor Douglas Clyde who was to present the plaque on behalf of the Institution could not attend due to family

illness, so John Webster valiantly stepped in and did the job most capably. Otherwise the ceremony went off as planned.

After the formalities, those present were feted with a bumper afternoon tea which completed a most enjoyable occasion.



Port Adelaide Swing Bridge Tower Receives Historic Engineering Marker

The Old Jervois Bridge which was opened by Governor Jervois in 1878, had a swing span to allow ships to pass through to the old Port Reach south of the bridge.

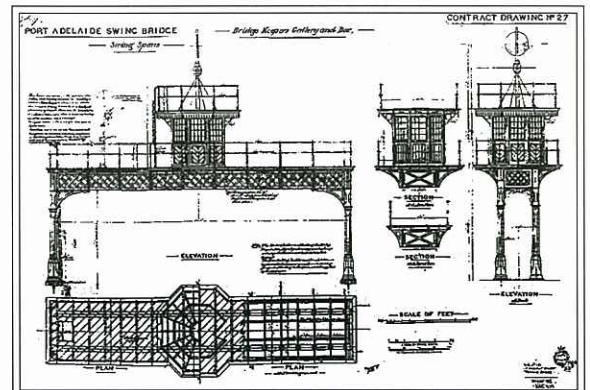
The bridge was one of the earliest of its type in Australia, and the bridge keepers gallery and (operator's) box demonstrate the ornate detail in design typical of the era. The swing span was originally steam driven, but was later electrified.

The bridge made a significant contribution to the development of Port Adelaide and South Australia, as it provided direct access to road and rail transport from Semaphore, a major sea side resort and the point where overseas mail was discharged.

When the bridge was demolished in 1969, the gallery and box were salvaged and relocated nearby. To commemorate the

bridge and to recognise its significance, an Historic Engineering marker has been placed on the Bridge Keepers Gallery and Box. It was unveiled at a ceremony on 16 October 1994 by Glen Parkinson, President of the South Australian Division of the Institution and the Mayor of Port Adelaide, Mr Bob Allen.

After lunch there was a two hour cruise on the recently restored steam tug Yelta, owned by the South Australian Heritage Museum. Yelta was built in 1949 by the Cockatoo Docks and Engineering Company, Sydney and after 27 years service guiding vessels out of Port Adelaide, she was laid up in 1976.



Museum Workers

At the end of 1994 the Department of Environment and Heritage published the brief for a study of Cultural Heritage Places in the South East Queensland 2001 Region. Despite the fact that the region includes Brisbane and Ipswich the brief, which ran to 18 pages, completely ignored industry and most public utilities, including electricity, water supply and sewerage. Fortunately the Queensland Heritage Panel was able to draw the attention of the Department to these serious omissions and we understand that the final requirements of the Brief have been suitably modified.

Three Queensland Heritage Panel Members, Emeritus Professor Syd Prentice, and Messrs Kel Garland and Ian George, have for some time been quietly working on the database of the Queensland Museum Social History Section.

The original database was imported from another museum, and is not well suited to classification of technological material. The terminology of the basic system can be supplemented and rationalised, and the system improved, so as to be applied readily to the extensive and valuable holdings that the Museum has of electrical engineering artefacts.

The Museum holds artefacts which can be used to trace the development of incandescent lights, plugs and sockets, switches, etc. For example, over 400 light globes have been classified.

It is proposed to standardise classifications, using language which laymen can understand and use. This should facilitate accurate classification and recording of electrical engineering materials registered with the Museum. The improved system should in turn make the holdings considerably more accessible than at present.

Charter Towers Pumping Station

The 1885 Hathorn Davey pumping engine at the Charters Towers Pumping Station on the Burdekin River, is the last of its type in the world. It has in the past, attracted considerable interest from heritage professionals in the UK.

At short notice, Norm Whyte of Department of Primary Industries (Water Resources) and a member of the Queensland Heritage Panel, provided comment on behalf of the Institution, in relation to a proposal to restore the engine.

The proposal is tourism-related at this stage, and Norm's advice, whilst cautionary, was supportive and constructive.



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NEWCASTLE, NSW AUSTRALIA

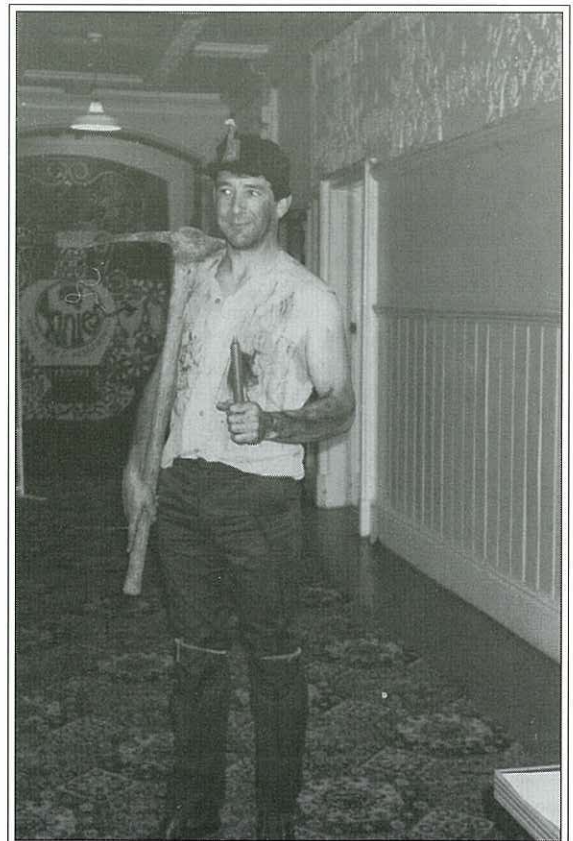
29 SEPTEMBER - 2 OCTOBER 1996

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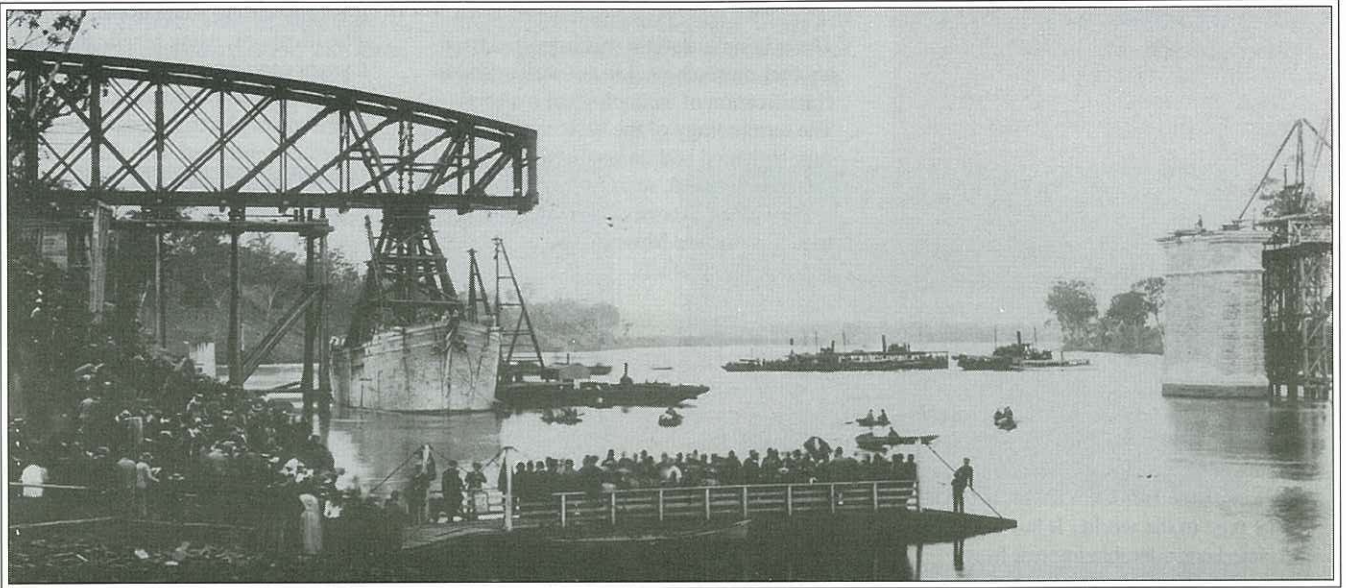
Seen at the First Australasian Engineering Heritage Conference - Malcolm the Miner - Malcolm Clark presented to conference delegates an invitation to attend the 1996 International Engineering Heritage Conference in Newcastle

Albert Bridge

Queensland Heritage panel's most recently enlisted member, Mike Martin of Q Rail, has found the following article

about the Albert Bridge which is fast approaching its centenary. The Albert Bridge spans the Brisbane River between

Indooroopilly and Chelmer. "The Age" was a Catholic newspaper circulating in Brisbane at the time.



Albert Bridge

The New Albert Bridge was tested by Engineers on Saturday last, and the result was perfectly satisfactory. Chelmer and Sherwood residents are now freed from ferry troubles. The tests made of the bridge were of two classes, that by means of a standing load and that by means of a moving load. The load was composed of two trains. each train consisted of eight trucks of railway iron drawn by two large engines. The weight of each train was 260 tons (264 t), so that the total load was 520 tons (528 t). For the stationary tests the load was allowed to remain for 10 minutes in the centre of each span alternately. The deflection was recorded by observers stationed at the centre and one-fourth out from the end of each span. In the case of the stationary test the deflection was about 1.10 inch (28mm), and when the load was removed the spans resumed almost their former position.

For the running test equally heavy trains were employed. It was arranged that one

train should start from Chelmer and the other from Indooroopilly, and travelling at the rate of 30 miles an hour (48.3km/hr), meet on the first run in the centre of one span, and on the second run in the centre of the other span. Before this was done the trains ran over the distance singly to gauge the time to be allowed. The first test was not successful, as one train was late. The next two tests, however, were more successful, the trains on each occasion passing almost where required. The vibration of the bridge was observed by means of theodolites and sights, and the deflection with the taut wire and gauges as in the case of the stationary test. Several gentlemen stood on the bridge when the various tests were made, and they found that despite the high rate of speed at which the heavy trains ran for the moving tests the vibration was very slight. The theodolite observations gave an almost inappreciable result. The deflection during the running tests was about 1.65 inches

(42mm). The observed permanent set, taken about four hours after the tests, was 0.12 inch (3mm) in the centre of the north span, and 0.48 inch (12mm) in the centre of the south span.

The first engine to cross the bridge was No. 212 (a B15 class). The driver was Zachariah Smith, and his fireman was WA Alexander, both of whom came down from Maryborough to assist in the operations.

The tests were made under the supervision of the Chief Engineer and Mr Keir, the observers being officers of the engineering branch.

After the standing test had been made a few of the visitors met in the contractor's office where a couple of toasts were honoured.

The Age - 24 August 1895

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Improving a Transport Landmark

Work has started on the conservation and adaptation of Sydney's Central Railway to make the landmark building more accessible to the thousands of commuters and travellers who use it every day.

The focus of the \$12M project, the first partnership between NSW Public Works and State Rail Authority, is on improving the pedestrian access between street level and concourse level at the north-east and north-west corners of the building, and providing disabled access between the two levels. Escalators will provide pedestrian access from the street to the concourse level, and the existing bus and coach terminal and police station are being moved to this part of the site.

Street level shops on the Eddy Avenue frontage are to be returned to their original 1906 condition to improve their potential for commercial viability. Luckily, most of the original fabric survives because of the previous under use of these spaces. Work includes refurbishing the timber and glazed shopfronts, internal repairs, the repair of the existing spiral stairs up to the mezzanine at the back of the shops and painting throughout.

The colonnade facing the pedestrian walkway on the eastern side is to be returned to

public space, with new shops to be constructed behind it. A new arch and improved paving in the Eddy Avenue facade will assist passenger movement flow from the suburban platforms to the rest of the station. The major conservation element in the whole project, however, is the stonework, which will be generally repaired and protected.

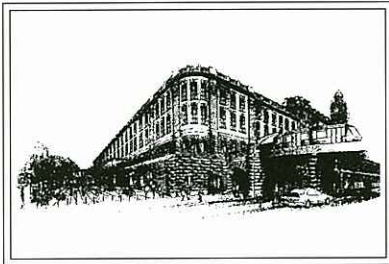
In a separate but related development, the Department of Transport is reinstating a light rail link on the ramps leading to the concourse from Hay Street, in a bid to improve the connection between Central Station and the commercial heart of the city.

Work on the project is expected to be completed by September next year. The improvements are timely, in view of a master plan for the Central Railway precinct recently developed by Public Works for State Rail to help improve the relationship between this important transport landmark and nearby universities, parks and other facilities.

From *Heritage News*



Ad hoc drainage solution on Eddy Avenue shopfront



Artist's perspective of eastern colonnade

Letters to the Editor

I have just read the October Newsletter of the NCEH and found it was interesting and digestible from cover to cover. Some matters seem to warrant comment.

I did not notice an overall address, or a Division by Division list of addresses (and phone numbers) to which one can direct questions or comments. (Perhaps there was such a list, but, due to two recent cataract operations, I am not reading or writing as well as before). As there were three (!) empty pages at the end, the Editor could surely have added that useful list. (See centre lift-out) On Page 10 we are asked to call attention to old steam boilers which may be obtained to drive some steam plant. When I was working for the Irrigation and Water Supply Commission, there were three or four portable (steel tyred) boilers in its Rocklea Depot. As that was in the years between 1950 and 1978, and as they were stored outdoors, it is possible that there may not be much left of them except rust, today! We used them for pile driving on Bonshaw Weir, Cunningham Weir and other weirs in SE Queensland. Of course, steam was infinitely more efficient than the use of compressed air. However one problem was that it was hard to find men who held Steam Boiler "Tickets" acceptable to the Department of Machinery.

I have just recalled a jolly incident involving one of these units. A steam fitter climbed up onto one of them to complete some maintenance which he had left incomplete, some months before. He had left an old bucket on top, full of nuts, bolts, split pins etc. On bringing it down to grass level, he found it had filled with rain-water and green slime. He tipped this out only to find it also contained a huge red-bellied brown snake. Neither party was happy at making the acquaintance of the other!

The heading of the article under discussion reminds me of a recent

machinery accident. It was announced on the TV News that "two fitters and an apprentice had been injured while they were working to remove an old boiler from the basement of an abandoned factory". A new "presenter" (a new term) threw in a gratuitous comment... "But what was the old dear doing down there?"

By the way, the way to store all such steam equipment for long periods is to completely fill all internal spaces (water, steam, or fire) with water to which is added a little heavy lubricating oil. In the 1950's/1970's, there were also several such portable boilers at the Virginia Stores of the Main Roads Board.

Page 18 tells of the beautiful sewage line aqueduct at Geelong which is no longer of use, yet, while it is of value as a "museum piece" it may not be safe unless huge amounts are spent on its maintenance. I recognise the dilemma faced by those who must decide what is to be done. If, (and I emphasise the "IF") it cannot feasibly be saved, perhaps a compromise can be effected by retaining the overhauling a couple of spans - say one at each end. These can be preserved as a permanent "exhibit", with access from the opposite banks. The remainder can then be demolished, if the public cannot be protected from falling masonry. I admit this is not a good compromise, but compromises are rarely comfortable. Chapter V, verse 18 of the Second Book of Kings give us a good example of this. The situation, called "to bow in the Temple of Mammon", has become proverbial to indicate a dangerous or amoral compromise. Before we even set foot inside that pagan precinct, we must always be certain that a more moral alternative is not available.

Morris S Ochert

Obituaries

Douglas George Sanderson 1924 - 1994

Doug died in Brisbane on Thursday 15 December 1994, aged 70, after a two year battle against cancer. He leaves a wife and two student children.

Doug was an active member of the Heritage Panel, and prepared the paper presented to the Annual General Meeting of the Panel on 8 November, on the History and Heritage of Broadcasting. It was our good fortune at the 11th hour, after discussion with Doug, to rope in his one time supervisor and good friend Ron Tolmie to present the paper on Doug's behalf after it became clear that Doug would not physically be able to present it himself.

Thanks to informal planning and co-ordination, the Heritage Panel arranged for a foyer display about broadcasting heritage to be mounted in November to support the content of the lecture at the Annual General Meeting. Despite his physical

condition, Doug assisted in mounting the exhibit at the end of October. It is, in keeping with Doug's productive output, of the very highest standard, and thanks to circumstances both unplanned and beyond our control, is still there as a kind of working and posthumous tribute to its planner and designer.

A somewhat less ephemeral tribute to his professional engineering is an immaculately maintained but recently retired transmitter, largely of Australian manufacture, which carried the code-name VLQ9. This treasure is currently secure at the Bald Hills Transmission Station, and its conservation, a Sanderson initiative, is the subject of correspondence between Queensland Division and the National Transmission Agency.

Doug has a somewhat unusual claim to Institution fame in that he gained corporate membership partly through satisfying the

requirements of and sitting for Institution examinations, at the mature age of about 39.

Having worked for the Post Master General and then Telecom continuously for 48 years in Queensland and Papua New Guinea, he was well qualified to write a history of the National Broadcasting Service in those areas. This he did in 1988, and the Division library holds a copy of it, presented by Doug in August 1993 and entitled "On Air". It is well worth reading and probably worth publishing.

Those of us privileged to have known him knew a wit, a gentleman and a thoroughly professional engineer. True to his nature, he "hung on to his marbles" right to the end, and provided an extraordinary example of service to his fellow Institution members.

Denis Cumming

MA (Oxon) MICE MIE Aust CP Eng 1923 - 1995

Denis Arthur Cumming was born at Weymouth, Dorset, UK on 17 September 1923, the second son of Captain Alistair Cumming RN. After seven years at Ampleforth College, York he read Engineering Science at Oxford University graduating with first class honours in 1944.

During World War II he worked for the Inter-Services Research Bureau on the development of some special weapons and military devices giving service in the UK

including hydroelectric and oil refinery constructions. Denis migrated to Australia in 1949

He worked with the Victorian State Rivers and Water Supply Commission on the Eildon Weir from 1949-51, The Commonwealth Department of Works at Woomera, SA from 1951-52 on the construction of rocket facilities, The Highway Department, Adelaide, 1952-58 and entered academic life at the University of NSW in 1958.

In 1967 he joined the University of Adelaide as Senior Lecture in the Department of Civil Engineering with particular interest in Geomechanics, Transport Engineering and Surveying. His former students will remember his Survey Camps at Leigh Creek and Mylor.

Denis had a strong interest in history, the history of engineering and our engineering heritage. It was his idea that the Institution of Engineers, Australia should form the National and Division Committees on Engineering Heritage and he became its driving force. He was the inaugural chairman of the first

such committee (in South Australia) which was formed in 1974. Subsequently he served on the National Committee on

Engineering Heritage from its inception in 1979 as a member, as chairman for two years and then corresponding member until his death.

Increasing an awareness of our engineering heritage within the profession and the community generally to enable a greater appreciation of the contribution engineering has made to society was an important part of his life's work.

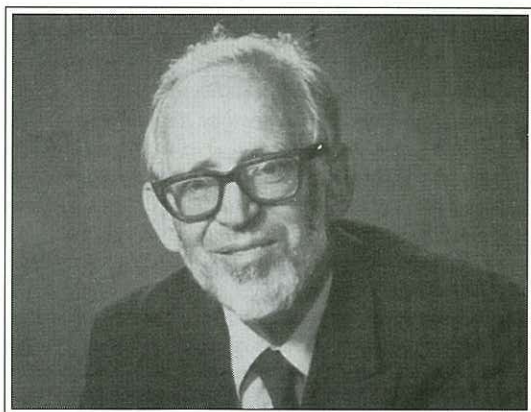
He was a member of the History and Heritage Committee of the SA Jubilee 150 Committee with special responsibility for the Moonta Mines project.

A significant written contribution to engineering and engineering heritage has also been made with his many papers and the definitive book for which he was co-author "They Built South Australia Engineers, Technicians, Manufacturers, Contractors and Their Works". This book was published in 1986 for the South Australian sesqui centenary and is possibly his most important work.

In 1988 his contribution to Engineering Heritage work was recognised when he was presented with an Institution of Engineers Australia Plaque.

Denis continued researching and writing with great enthusiasm after he moved to Perth in 1990.

Denis died suddenly on 28 January 1995 while enjoying his hobby of sailing and is survived by his wife and four children. He will be sadly missed by his close friends and many colleagues.



and France. After the war employment with John Mowlem and Company Limited a Civil Engineering Contractor, gave Denis experience on a diverse range of projects